

SPICE Device Model Si2333DS

Vishay Siliconix

P-Channel 12-V (D-S) MOSFET

CHARACTERISTICS

- P-Channel Vertical DMOS
- Macro Model (Subcircuit Model)
- Level 3 MOS

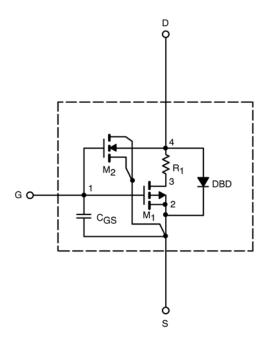
- Apply for both Linear and Switching Application
- Accurate over the -55 to 125°C Temperature Range
- Model the Gate Charge, Transient, and Diode Reverse Recovery Characteristics

DESCRIPTION

The attached spice model describes the typical electrical characteristics of the p-channel vertical DMOS. The subcircuit model is extracted and optimized over the -55 to 125°C temperature ranges under the pulsed 0-V to 5-V gate drive. The saturated output impedance is best fit at the gate bias near the threshold voltage.

A novel gate-to-drain feedback capacitance network is used to model the gate charge characteristics while avoiding convergence difficulties of the switched C_{gd} model. All model parameter values are optimized to provide a best fit to the measured electrical data and are not intended as an exact physical interpretation of the device.

SUBCIRCUIT MODEL SCHEMATIC



This document is intended as a SPICE modeling guideline and does not constitute a commercial product data sheet. Designers should refer to the appropriate data sheet of the same number for guaranteed specification limits.

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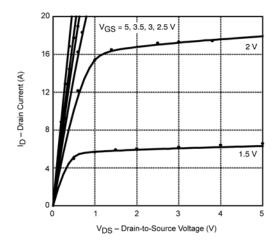
SPECIFICATIONS (T _J = 25°C UNLESS OTHERWISE NOTED)					
Parameter	Symbol	Test Condition	Simulated Data	Measured Data	Unit
Static	-		-	-	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_{D} = -250 \mu A$	0.70		V
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \leq -5 \text{ V}, V_{GS}$ = -4.5 V	116		Α
Drain-Source On-State Resistance ^a	r _{DS(on)}	$V_{GS} = -4.5 \text{ V}, I_D = -5.3 \text{ A}$	0.023	0.025	Ω
		$V_{GS} = -2.5 \text{ V}, I_D = -4.6 \text{ A}$	0.034	0.033	
		$V_{GS} = -1.8 \text{ V}, I_D = -2 \text{ A}$	0.049	0.046	
Forward Transconductance ^a	g _{fs}	$V_{DS} = -5 \text{ V}, I_{D} = -5.3 \text{ A}$	17	17	S
Diode Forward Voltage ^a	V_{SD}	I _S = -1 A, V _{GS} = 0 V	-0.78	-0.70	V
Dynamic ^b	-		•		
Total Gate Charge	Q _g	$V_{DS} = -6 \text{ V}, V_{GS} = -4.5 \text{ V}, I_{D} = -5.3 \text{ A}$	9.3	11.5	nC
Gate-Source Charge	Q_{gs}		1.5	1.5	
Gate-Drain Charge	Q_{gd}		3.2	3.2	
Turn-On Delay Time	t _{d(on)}	$V_{DD} = -6 \text{ V}, R_L = 6 \Omega$ $I_D \cong -1 \text{ A}, V_{GEN} = -4.5 \text{ V}, R_G = 6 \Omega$	21	25	ns
Rise Time	t _r		19	45	
Turn-Off Delay Time	$t_{d(off)}$		73	72	
Fall Time	t _f		15	60	

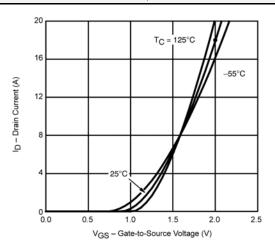
Notes a. Pulse test; pulse width $\leq 300~\mu s,$ duty cycle $\leq 2\%.$ b. Guaranteed by design, not subject to production testing.

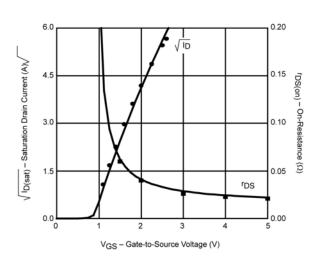


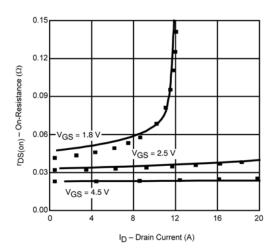
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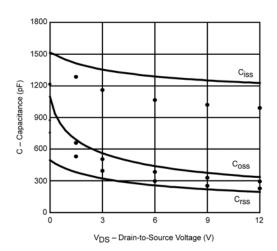
COMPARISON OF MODEL WITH MEASURED DATA (TJ=25°C UNLESS OTHERWISE NOTED)

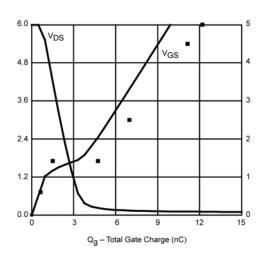












Note: Dots and squares represent measured data.